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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
CURTIS, CRAIG	
ART UNIT	**PAPER NUMBER**
2872	

DATE MAILED: 01/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/891,795	ZHAO, BIN	
	Examiner	Art Unit	
	Craig H. Curtis	2872	

-- The MAILING DATE of this communication appears on th cover sheet with the correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on 02 October 2003.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 24-49 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 24-49 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

Detailed Action

Disposition of the Instant Application

- This Office action is responsive to Applicant's Amendment B filed on 2 October 2003, which has been made of record in the file as Paper No. 9.
- By this amendment, Applicant has amended claims 24-37, 44, and 49. More specifically, Applicant has amended independent claims 24 and 37 to include, in each instance, the limitation "..., the difference in optical path lengths being sufficient to facilitate interleaving."; and dependent claims 36 and 49 have been amended to include, in each instance, the limitation "...by changing the distance between polarization beam splitter and the reflector."
- Claims 24-49 are currently pending in the instant application.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 36 and 49 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationship is as follows: since a polarization beam splitter is not recited in either independent claim 24 or independent claim 37, the structural cooperative relationship between this element and the recited reflector cannot be ascertained.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371© of this title before the invention thereof by the applicant for patent.

2. The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

3. Claims 24-31 & 37-44 are rejected under 35 U.S.C. 102(e) as being anticipated by Chang et al. (6,335,830).

With regard to claims 24 and 37, Chang et al. disclose (with, e.g., reference to Fig. 4a) the invention as claimed—[a]n interleaver comprising:

a birefringent element assembly (all or any part of the system depicted in Fig. 4a) comprising at least one spatial birefringent element (e.g., 400, 492, 490), the birefringent element assembly providing two output components. See, e.g., 493, 495;

a reflector (450 and/or 452 and/or 472) configured to direct the two components from the birefringent element assembly back through the birefringent element assembly. See Fig. 4a; and

wherein each spatial birefringent element defines two light paths (See Fig. 4a), each light path having a different optical path length (inherent) and wherein a difference in optical path length between the two paths is provided by a material having an index of refraction greater than one (inherent; **it is respectfully suggested, incidentally, that the recitation "one" be changed**

to "unity"—that is, ... having an index of refraction greater than *unity*) which is disposed within at least a portion of one of the first and second paths (inherent), the difference in optical path lengths being sufficient to facilitate interleaving (inherent: please see Response to Arguments section) see Fig. 4a.

With regard to claims 25 and 38, Chang et al. further teaches wherein said interleaver comprises a polarization rotator (402) configured to make the two components approximately the same in polarization with respect to one another prior to the two components being transmitted back through the birefringent element assembly.

With regard to claims 26 and 39, said reflector comprises a prism (450 and/or 452).

With regard to claims 27 and 40, said reflector comprises a mirror. See col.7, ll. 15-19.

With regard to claims 28 and 41, Chang et al. explicitly disclose wherein said polarization rotator comprises a half-wave waveplate. See col. 5, ll. 38-41.

With regard to claims 29 and 42, Chang et al. further disclose wherein said reflector comprises a mirror and a quarter-wave waveplate. See col.7, ll. 15-19.

With regard to claims 30 and 43, the birefringent element assembly of the interleaver of Chang et al. comprises a plurality of spatial birefringent elements (e.g., 400, 490, 4902, 410, 430, etc.).

With regard to claims 31 and 44, Chang et al. is taken to meet the recited limitations wherein said birefringent element assembly comprises a first birefringent element having an equivalent angular orientation of f_1 (402) a second birefringent element having an equivalent angular orientation of f_2 (410), and a third birefringent element having an equivalent angular orientation of f_3 (430) (it being noted that as presently recited, f_1, f_2, and f_3 can be either identical to or distinct from one another); wherein an order of the first birefringent element, second birefringent element, and third birefringent element is (selected from the group consisting of):

first birefringent element, second birefringent element, and third birefringent element.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 32-36 & 45-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al. (6,335,830).

With regard to claims 32 and 45, Chang et al. disclose the invention as set forth, including wherein said first birefringent element has an equivalent angular orientation of 45^0 (col. 5, ll. 38-41) and a phase delay of (inherent) **EXCEPT FOR** explicit teachings of the following:

wherein said second birefringent element has an equivalent angular orientation of -21^0 and having a phase delay of 2 ; and

said third birefringent element has an equivalent angular orientation of 7^0 and having a phase delay of 2 .

It is notoriously old and well-known in the optical filter art, however, to assemble optical systems (Solc filter systems, for example) in which first, second, and third birefringent elements respectively have the above-recited equivalent orientations. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the invention of Chang et al. such that said second and third birefringent elements be disposed having the above-recited equivalent orientations, for at least the purpose of allowing a passband of said interleaver to be flattened to a selectable degree, since it has been held that where the general

conditions of a claim are disclosed in the prior art, discovering optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

With regard to claims 33 and 46, said birefringent element assembly comprises two birefringent elements. See above.

With regard to claims 34 and 47, please see the comments made above with respect to claim 32 and 45

With regard to claims 35 and 48, please see Fig. 4a.

With regard to claims 36 and 49, it is submitted that said interleaved channels have spacing (read: spacing**s**) which is (read: **are**) tunable by changing the distance between polarization beam splitter and the reflector (it being noted that said polarization beam splitter is not presently recited in either independent claim 24 or independent claim 37), provision of adjustability, where needed (in this instance for the purpose of achieving a separation between elements sufficient to achieve a desired interleaving), involving only routine skill in the art. *In re Stevens*, 101 USPQ 284 (CCPA 1954)

Response to Arguments

5. Applicant's arguments filed 2 October 2003 have been fully considered but are not persuasive.

Applicant initially argues that any difference in path lengths of (read: *disclosed by*) the Chang et al. device is merely incidental and does not result in interleaving, and that interleaving is facilitated in the Chang et al. device via birefringent assembly 420 of Figure 4A, which uses birefringent crystals 424 and 426 according to well-known principles, rather than using spatial birefringence.

Applicant subsequently asserts that " the difference in optical path lengths in the Chang et al. device does not effect interleaving", and that it is important to appreciate that interleaving is facilitated in the present invention by spatial birefringence (differences in optical path caused by spatial differences and/**or** the use of materials having different indices of refraction (emphasis added)), whereas interleaving is facilitated in the Chang et al. device via its birefringent crystals 424 and 426. For reasons set forth below, the Examiner respectfully disagrees with Applicant's arguments.

With regard to Applicant's argument that any difference in path length imparted by the Chang et al. device (viz., path length differences imparted by elements 400 and 402, e.g.) is merely incidental and does not result in interleaving, the Examiner submits that, given the fact that the device of Chang et al. does indeed facilitate interleaving, that the difference in optical path lengths imparted by Chang et al., however small, must be sufficient to facilitate interleaving. Moreover, inasmuch as each element in the Chang et al. device contributes to achieving a desired interleaving effect, any difference in optical path lengths imparted by Chang et al. can arguably be characterized as being sufficient to facilitate interleaving (especially when the interleaving effect of the device as a whole is taken into consideration).

Finally, it is noted by taking Applicant's alternative definition of spatial birefringence (i.e., differences in optical path caused by the use of materials having different indices of refraction), no distinction can be made between "spatial" birefringence (so defined) and the birefringence facilitated via birefringent crystals in the Chang et al. device, because birefringent crystals inherently impart differences in optical path length (upon unpolarized light incident thereon) by virtue of the fact that they exhibit, by definition, different indices of refraction with respect to mutually orthogonally polarized beams/components of light.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig Curtis, whose telephone number is (703) 305-0776 ((571) 272-2311 after 1/20/2004). The centralized facsimile phone number for the USPTO is (703) 872-9306.

Any inquiry of a general nature regarding the status of this application should be directed to the Group receptionist, whose telephone number is (703) 308-0956.

C.H.C.
Craig H. Curtis
Group Art Unit 2872
7 January 2004

Audrey Chang
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